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PO BOX 747
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EXAMINER

HOLT, DAVID L

ART UNIT	PAPER NUMBER
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2609

NOTIFICATION DATE	DELIVERY MODE
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05/08/2007

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary

Application No.

10/755,356

Applicant(s)

OTA ET AL.

Examiner

David Holt

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 March 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 02/11/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 02/11/2004 was filed after the mailing date of the application on 01/13/2004. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "semiconductor substrate" referred to in claims 1 through 3, the "color filter" referred to in claim 7, and the "digital camera" referred to in claim 8 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate

changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The abstract of the disclosure is objected to because it has more than one paragraph, more than 150 words, and contains improper language. As is, the abstract is not clear and concise. In particular, it is suggested that references to drawings and superfluous phrases, such as "a solid-state imaging element of the present invention.." (Line 5), be avoided. Correction is required. See MPEP § 608.01(b).
5. Applicant is reminded of the proper language and format for an abstract of the disclosure.
6. The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 2, and 5-7 rejected under 35 U.S.C. 102(b) as being anticipated by Turner US 2002/0190254 A1.

9. In reference to claim 1, there are three major limitations of the claim:

- a. A solid-state imaging element comprising a plurality of photoelectric converting regions which are arranged on a surface of a semiconductor substrate along a row direction and a column direction perpendicular to the row direction
- b. each of the photoelectric converting regions contains a main region having a relatively wide light-receiving area and a sub-region having a relatively narrow light-receiving area
- c. a partial photoelectric converting region within the plurality of photoelectric converting regions outputs photoelectric converting signals having different spectral sensitivities with respect to the main region and the sub-region

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These limitations are each taught in the prior art. Turner discloses that "color detector groups of the present invention can be configured into an array of color detector groups...configured in a mosaic detector group having two rows and two columns of color detector groups." This column and row structure is further pictured in Figures 5A-F as well as Figures 8A-D. Turner defines a color detector group as being "formed on a semiconductor substrate and comprises a plurality of detector layers." This structure is equivalent to that described in limitation (a) of claim 1. (page 2, paragraphs 14 & 17; US 2002/0190254 A1)

Turner further discloses that each color detector group has a plurality of detector layers, which are analogous to the regions claimed in limitations (b) and (c) of claim 1. More specifically, Turner teaches that "the detector layers have different spectral sensitivities based on their different depths in the semiconductor substrate," which is equivalent to limitation (c) of claim 1. Turner also teaches that "arrays of color detector groups can be configured with larger collection areas for blue and red than the collection area for green," which he teaches "will reduce the presence of aliasing artifacts in interpolated images generated with such a sensor." This is equivalent to the main and sub regions claimed in limitation (b) of claim 1. (page 2, paragraph 4 & page 6, paragraph 61; US 2002/0190254 A1)

10. Claim 2 of the examined application shares limitations (a) and (b) of claim 1, as discussed above, but also includes three additional limitations:

- d. a first sort of photoelectric converting region in which both the main region and the sub-region output photoelectric converting signals having a first spectral sensitivity
- e. a second sort of photoelectric converting region in which the main region outputs a photoelectric converting signal having a second spectral sensitivity and the sub-region outputs a photoelectric converting signal having a third spectral sensitivity
- f. a third sort of photoelectric converting region in which the main region outputs a photoelectric converting signal having a third spectral sensitivity and the sub-region outputs a photoelectric converting signal having a second spectral sensitivity

As written and interpreted, the three spectral sensitivities referred to in these limitations may or may not be the same spectral sensitivity. It has been further interpreted that a photoelectric converting region may belong to a single "sort" or to multiple "sorts" of any combination. It is asserted that these interpretations are reasonable based on the language of the claims.

Limitations (d), (e), and (f) of claim 2 are all taught by Turner in Figure 12 of the prior art. Any single "collection area" of a specific color, e.g. a "green collection area," teaches limitation (d). Any combination of two "collection areas" of two different colors teaches limitations (e) and (f). In this analysis, the word "area" is considered a synonym of "region," where region can be defined as a large, usually continuous segment of a surface or space.

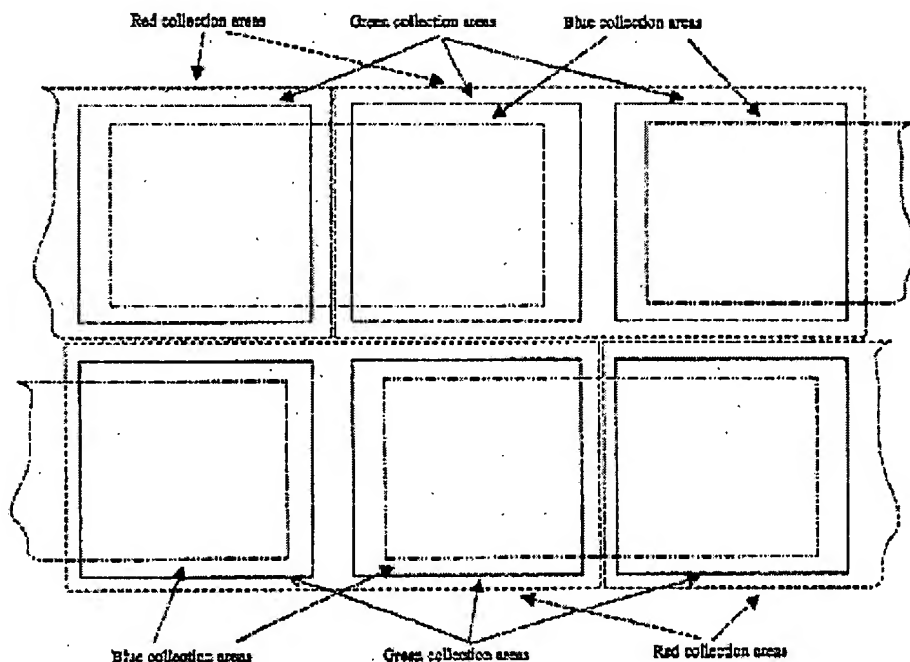


Fig. 12

11. Claim 5, viewed in light of claim 2, shares the limitations of claim 2, discussed above, and adds the limitation: the first spectral sensitivity to the third spectral sensitivity are any of spectral sensitivities as to a red color, a blue color, and a green color. Turner, teaching this limitation, discloses that "the present invention provides a color detector group that includes circuitry for converting photons from blue, green and red illumination into electrical signals." (page 2, paragraph 15; US 2002/0190254 A1)

12. Claim 6, viewed in light of claims 2 and 5, shares the limitations of claim 5, discussed above, and adds the limitation: the first spectral sensitivity corresponds to a spectral sensitivity of a green color. As mentioned above, Figure 12 discloses a "green collection area" that teaches limitation (d) of claim 2 as well as satisfies this additional limitation of claim 6.

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13. Claim 7, viewed in light of claim 1, shares the limitations of claim 1, discussed above, and adds the limitation: the spectral sensitivity is determined by a color filter positioned above said main region and said sub-region. Turner, teaching this limitation, discloses that "the disclosed embodiments of arrays of color detector groups can optionally be modified by the addition of a pattern of optical color filters applied over the array." (page 3, paragraph 19; US 2002/0190254 A1)

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

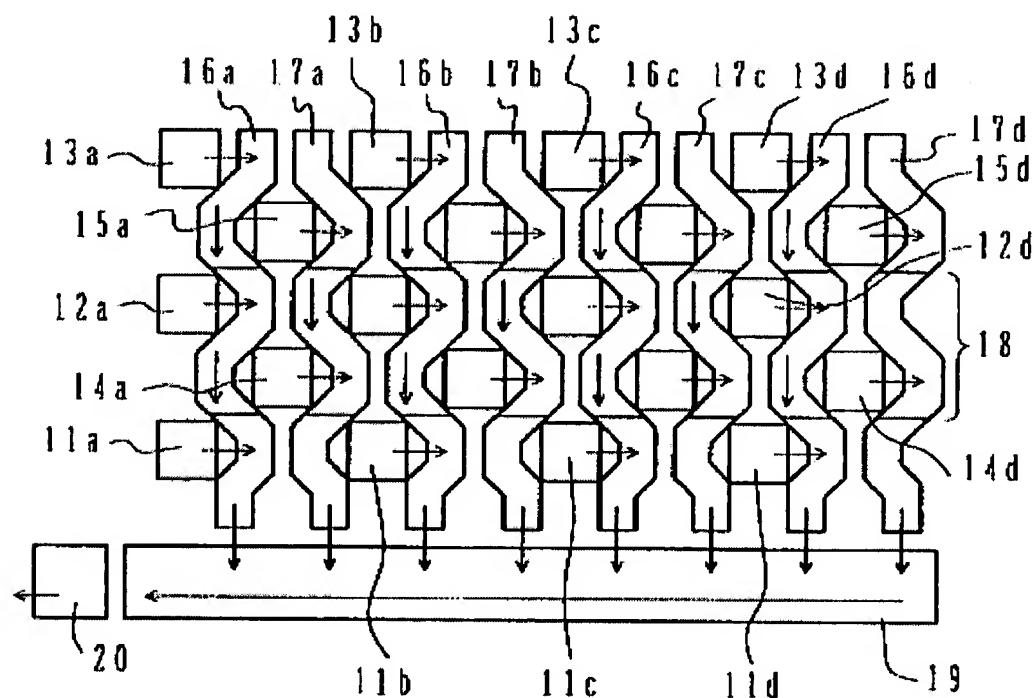
15. Claims 3, 4, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner US 2002/0190254 A1 in view of Yamada US 6,236,434 B1.

16. In reference to claim 3, Turner discloses limitations (a) through (f) of claim 2 as discussed above, but does not disclose the following limitations:

- g. a vertical transfer portion for independently transferring the signal electron charges from the photoelectric converting regions to the main region and the sub-region along the column direction;
- h. a horizontal transfer portion transferring the signal electron charges from the vertical transfer portion along the row direction
- i. an output portion for outputting a signal corresponding to the signal electron charges transferred by said horizontal transfer portion

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Yamada, like Turner, teaches a solid-state image pickup device, but focuses his invention on "a novel layout of its components." Figure 1 clearly shows the limitations: a vertical transfer portion (16a), corresponding to limitation (g); a horizontal transfer portion (19), corresponding to limitation (h); and an output portion (20), corresponding to limitation (i).

FIG. 1

17. In reference to claim 4, in view of claim 2, Turner discloses limitations (a) through (f) of claim 2 as discussed above, but does not disclose the following limitation:

- j. the first sort of photoelectric converting region is arranged in a rectangular lattice shape along both the row direction and the column direction perpendicular to the row direction; both the second sort of photoelectric converting region and

the third sort of photoelectric converting region are arranged in a staggering shape and are arranged as an entire region in a rectangular lattice shape along the row direction and the column direction perpendicular to the row direction; and the first sort of photoelectric converting region, the second sort of photoelectric converting region, and the third sort of photoelectric converting region are arranged in the same arranging pitch at such positions which are positionally shifted by a $1/2$ of the arranging pitch along the row direction and the column direction

Yamada, like Turner, teaches a solid-state image pickup device, but focuses his invention on "a novel layout of its components." Figure 1 clearly shows a honeycomb layout of photosensitive regions (11a-d, 12a-d, 13a-d, 14a-d) that matches the layout described in limitation (j).

18. In reference to claim 4, in view of claim 3, Turner discloses limitations (a) through (f) of claim 3 as discussed above, and limitations (g) through (i) in view of Yamada as discussed above, but does not disclose the following limitation:

j. the first sort of photoelectric converting region is arranged in a rectangular lattice shape along both the row direction and the column direction perpendicular to the row direction; both the second sort of photoelectric converting region and the third sort of photoelectric converting region are arranged in a staggering shape and are arranged as an entire region in a rectangular lattice shape along the row direction and the column direction perpendicular to the row direction; and the first sort of photoelectric converting region, the second sort of photoelectric

converting region, and the third sort of photoelectric converting region are arranged in the same arranging pitch at such positions which are positionally shifted by a $1/2$ of the arranging pitch along the row direction and the column direction

Yamada, like Turner, teaches a solid-state image pickup device, but focuses his invention on "a novel layout of its components." Figure 1 clearly shows a honeycomb layout of photosensitive regions (11a-d, 12a-d, 13a-d, 14a-d) that matches the layout described in limitation (j).

19. In reference to claim 8, in view of claim 1, Turner discloses limitations (a) through (c) of claim 1 as discussed above, but does not disclose the following limitation: the digital camera mounts thereon the solid-state imaging element.

Yamada, like Turner, teaches a solid-state image pickup device, but focuses his invention on "a novel layout of its components." Yamada teaches that the solid state image device would be "used with cameras." (column 1, line 18; US 6,236,434 B1)

At the time that the invention of the examined application was made, it would have been obvious to one of ordinary skill in the art to have combined the color detector groups (equivalent to photosensitive regions) taught by Turner with the layout taught by Yamada as discussed in the above claim rejections, because the layout that Yamada discloses is "capable of suppressing false signals such as moire, improving a photoelectric conversion efficiency, realizing high integration, optimizing spatial sampling of an image, and reducing a difference of the characteristics between photosensors to be caused by a position displacement of photosensors and column

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direction charge transfer devices during manufacture processes.” These are advantages over the classic layout taught by Turner and are some of the problems that the examined application seeks to solve. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made. (column 2, lines 58-65; US 6,236,434 B1)

Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yamashita et al. (US 7190403 B2) teaches a similar solid state image pickup apparatus to that disclosed in the invention of the examined application, but the photosensitive converting regions only have one color corresponding to both the main and sub regions. Additionally, the reference has both a common inventor (not inventive entity) and assignee to the examined application. Oda et al. (US 6831692 B1) teaches a solid state image pickup apparatus that includes both large and small photodiodes that are in the same region as one another, but does not include an adequate explanation for how the color filters are arranged in relation to the photodiodes.

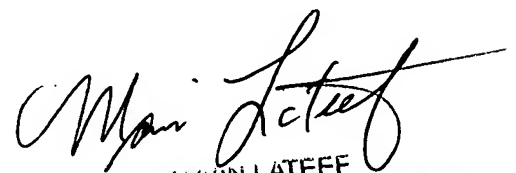
Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Holt whose telephone number is (571) 270-1369. The examiner can normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marvin Lateef can be reached on (571) 272-5026. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DLH


MAHVIN LATEEF
SUPERVISORY PATENT EXAMINER